

Arsenic linked to blood pressure increases during pregnancy

By Sara Mishamandani

Arsenic exposure is associated with greater increases in blood pressure over the course of a pregnancy, according to a new NIEHS-funded study of U.S. pregnant women. These findings may have important implications, because even modest increases in blood pressure can affect future cardiovascular disease risk for mothers and their children. Published online March 20 in the journal *Environmental Health Perspectives*, this is the first long-term [study](http://www.ncbi.nlm.nih.gov/pubmed/25793356) (<http://www.ncbi.nlm.nih.gov/pubmed/25793356>) to examine the association between arsenic and blood pressure during pregnancy in the U.S.

Focusing on a susceptible population

Lead author Shohreh Farzan, Ph.D., postdoctoral fellow at Dartmouth College, collaborated with researchers from the [Dartmouth Toxic Metals Superfund Research Program](http://www.dartmouth.edu/~toxmetal/) (SRP) Center, the [Columbia University SRP Center](http://superfund.ciesin.columbia.edu/), and New York University (NYU). Her study involved the analysis of longitudinal, or repeated long-term, blood pressure and urinary arsenic measurements for participants in the New Hampshire Birth Cohort Study, which is funded by the Dartmouth SRP and the [Children's Environmental Health and Disease Prevention Research Center](http://www.dartmouth.edu/~childrenshealth/).

The group of pregnant women who were studied live in New Hampshire and drink water from private wells, which are not regulated by state or federal governments. In some parts of the state, approximately one in five private wells contains levels of naturally occurring arsenic above the U.S. Environmental Protection Agency limit for drinking water.

Researchers found that women with higher levels of urinary arsenic during pregnancy had increases in systolic blood pressures and pulse pressures higher than those that normally occur over the course of a pregnancy. Systolic blood pressure normally increases an average of approximately 3.7 millimeters of mercury (mmHg) for systolic blood pressure between the first and third trimesters. The new study found, on average, that each increase in urinary arsenic of 5 micrograms per liter was associated with additional monthly increases in systolic blood pressure and pulse pressure of 0.15 and 0.14 mmHg, respectively.

According to the authors, the potential risk of later life cardiovascular diseases in mothers and children who are exposed to arsenic during pregnancy makes this a critical area of investigation.

Fostering collaboration — the K.C. Donnelly Externship

In 2013, Farzan was awarded a [K.C. Donnelly Externship Award Supplement](#) to complete a three-month externship with Yu Chen, Ph.D., NYU professor and Columbia SRP Center co-investigator (see [story](#)). At the time, Farzan was a postdoctoral fellow at the Dartmouth SRP Center, under the guidance of Margaret Karagas, Ph.D.

"With Chen's help, I learned to analyze longitudinal blood pressure measurements using data from the Health Effects of Arsenic Longitudinal Study (HEALS) in Bangladesh," Farzan said of her externship. "I was able to apply what I learned to the Dartmouth study, examining arsenic exposure in relation to blood pressure data over the course of pregnancy."

"I used a lot of what I learned and the preliminary data that I generated during my K.C. Donnelly Externship to write a Pathway to Independence Award application to continue studying the effects of arsenic on cardiovascular disease outcomes, which was funded by NIEHS last summer," said Farzan. She is currently in the training phase of that grant with mentors Chen and Karagas. "It's been great to be able to continue my work with the Dartmouth SRP and continue to collaborate with the Columbia SRP, too," she said.

Citation: Farzan SF, Chen Y, Wu F, Jiang J, Liu M, Baker E, Korrick SA, Karagas MR.

(<http://www.ncbi.nlm.nih.gov/pubmed/25793356>)

2015. Blood pressure changes in relation to arsenic exposure in a U.S. pregnancy cohort. *Environ Health Perspect* [Online 20 March 2015].

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)



Farzan received an SRP K.C. Donnelly Externship Award Supplement in 2013 and currently has a Pathway to Independence Award, known as a K99/R00 grant. (Photo courtesy of Shohreh Farzan)



Karagas leads the NIEHS-funded New Hampshire Birth Cohort Study at Dartmouth. (Photo courtesy of Margaret Karagas)

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